3.2 Noise

3.2 Noise

3.2.1 Studies and Coordination

This section is based on the findings of the *SR 509/South Access Road EIS Discipline Report: Noise* (Noise Discipline Report) (CH2M HILL July 2001), *SR 509/South Access Road EIS: South Airport Link* (CH2M HILL August 2001), and *SR 509/South Access Road EIS: I-5 Improvements Report* (CH2M HILL October 2001). These reports are incorporated into this FEIS by reference. The discipline reports also contain noise measurement data from locations in the vicinity of each alternative and from the area along I-5 south of South 216th Street to south of South 272nd Street. The *SR 509/South Access Road EIS: I-5 Improvements Report* (CH2M HILL October 2001) provided an additional analysis of existing and future traffic noise conditions and a discussion of noise mitigation for areas along the I-5 corridor between South 216th and South 310th Streets. Since publication of the RDEIS, a more detailed noise analysis was conducted to further evaluate potential noise barrier locations for the preferred alternative (Alternative C2), as required by FHWA. The detailed noise analysis is presented in Appendix I of this FEIS. For the purpose of the noise analyses, the project area is defined as the immediate vicinity of the SR 509 and South Access Road alignments and along the I-5 corridor from the proposed SR 509 interchange and South 310th Street.

In July 1992, The Parry Group completed and published a High Occupancy Vehicle Lane Traffic Noise and Noise Barrier Analysis (Parry 1992, revised 1993) of I-5 between the Fife/54th Avenue East interchange and the Southcenter/I-405 interchanges. The analysis identified 28 receptors with sound levels at 60 to 76 dBA. The analysis also identified two berms constructed in the 1980s to abate highway traffic noise for residents near the South 272nd Street interchange, and recommended barriers at 10 locations in the I-5 corridor. Seven of the ten barriers recommended in Parry (1992) were located between South 216th Street and South 320th Street. At the time of this FEIS, 6 of the 10 recommended barriers have been constructed.

Method of Analysis

Existing ambient sound levels were determined by measuring 38 sensitive receptor sites in the project area. Sound level measurements taken for the environmental documents for the third runway at Sea-Tac Airport and the I-5 HOV and truck climbing lane were also reviewed to determine ambient existing, as well as future, sound levels. A simplified version of the FHWA Noise Prediction Model Stamina 2.0, developed by Wayne C. Young of the Texas Department of Transportation, was used to generate noise contours at a level approaching the FHWA abatement criteria. These contours were plotted onto aerial photographs that were then used to count the number of sensitive receptors impacted by each alternative. Current noise-sensitive areas within the Sea-Tac Airport Noise Remedy Program areas were not included in the counts because the homes within the areas covered by this program would either be relocated or acquired by the airport in the future. Because design data were not available to determine the feasibility and reasonableness of likely mitigation for each of the alternatives, an alternative method of screening the level of noise abatement within the project area was proposed by WSDOT and approved by FHWA.

A modified analytical approach approved by FHWA was applied to compare alternatives. Previous studies for this and other projects throughout the project area indicate that even short barriers would not be built when more than 100 lineal feet of barrier per household benefited was required. This reasonableness criterion was used for all the alternatives.

For the detailed noise study conducted for the preferred alternative (Appendix I), all impacted neighborhoods were analyzed and reasonable and feasible noise barriers are recommended for construction in accordance with 23 CFR 772 and WSDOT Traffic Noise Analysis and Abatement Policy and Procedures.

Construction noise levels were estimated based on typical expected equipment noise levels provided by EPA.

Noise Regulations and Impact Criteria

State and local governments have primary responsibility to control noise sources and regulate levels of noise permitted in the environment. The federal government establishes noise source emission standards for products engaged in interstate commerce, such as individual automobiles and aircraft.

Applicable noise regulations and guidelines provide a basis for evaluating potential noise impacts. Noise regulations and guidelines specifying ambient indoor and outdoor sound levels are established by the FHWA, Ecology, and local jurisdictions.

Federal Highway Administration Noise Abatement Criteria

For federally funded highway projects, traffic noise impacts occur when predicted hourly traffic noise levels (L_{eq}[h]) approach or exceed the noise abatement criteria (NAC) established by the FHWA, or substantially exceed existing sound levels (U.S. Department of Transportation, 1982). “Approach” is defined by WSDOT as meaning within 1 dBA decibel. “Substantially exceed” is defined by WSDOT as an increase of 10 dBA or more over the existing level. The FHWA NAC for various land activity categories are presented in Table 3.2-1.

Table 3.2-1
FHWA Noise Abatement Criteria

Active Category	L_{eq} (h) (dBA)	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: U.S. Department of Transportation (1982).

State and Local Noise Regulations

King County and the Cities of Kent, SeaTac, and Federal Way regulate noise as a nuisance, but neither city has established property line standards specifying noise levels that cannot be exceeded at receiving properties. The Cities of Des Moines, Federal Way, Kent, and SeaTac do not have noise ordinances that apply to road construction or traffic noise; all defer to Ecology limits.

Ecology limits noise levels at property lines of neighboring properties (WAC Chapter 173-60). The maximum permissible noise levels depend on the land uses of both the source noise and receiving property. Ecology's property line noise regulations are presented in Table 3.2-2.

Table 3.2-2
Ecology Maximum Permissible Noise Levels (dBA)

	Receiving Property			
	Residential			
Noise Source	Day	Night*	Commercial	Industrial
Residential	55	45	57	60
Commercial	57	47	60	65
Industrial	60	50	65	70

* *Maximum permissible noise levels are reduced by 10 dBA for residential receiving property between 10 p.m. and 7 a.m.*
Source: WAC 173-60-040 (1989).

Sounds from motor vehicles on public roads are exempt from Ecology's property line regulations presented in Table 3.2-2, although the FHWA noise criteria still apply.

Construction noise from the proposed project would be exempt from regulations during daytime hours. However, project contractors and WSDOT crews would need to meet Ecology and local jurisdiction property line regulations during nighttime hours. Noise levels in Table 3.2-2 apply to construction equipment only at rural and residential receiving properties between 10 p.m. and 7 a.m. on weekdays and between 10 p.m. and 9 a.m. on weekends.

Coordination with Other Agencies and Groups

The TRANSPO Group, in cooperation with WSDOT, projected the future traffic volumes and speeds upon which this FEIS is based. Modeled traffic is summarized in *SR 509/South Access Road EIS Discipline Report: Transportation* (CH2M HILL January 2002). Traffic noise levels for worst-case traffic conditions were predicted for each alternative using peak-hour volumes at various speed limits to calculate the distance to the 66-dBA contour. Heffron Transportation and K2 & Associates provided vehicle percentages. Actual traffic volumes used for this analysis were provided in the Noise Discipline Report (CH2M HILL July 2001).

The measurements taken for the Port of Seattle's third runway project and WSDOT's HOV and truck climbing lane projects were compared with those taken on this project for verification. These measurements were used to fill in missing data from adjustments made in the alignment as the proposed project alternatives evolved.

The methodology for noise analysis on this project was developed in close coordination with FHWA.

3.2.2 Affected Environment

Land Uses and Noise Sensitive Areas

The project area is mostly residential, but includes both commercial and light industrial uses. Sea-Tac Airport is the largest traffic generator in the project area (CH2M HILL January 2002). The existing land use along the I-5 corridor between South 216th Street and South 310th Street is primarily single- and multifamily residential. There are several small businesses mixed in the residential areas surrounding the I-5/SR 516 interchange.

A large portion of the project area is located within the Sea-Tac Airport Noise Remedy Program areas. The Port of Seattle has undertaken a series of noise mitigation programs in the area surrounding Sea-Tac Airport; these include the Noise Acquisition and Relocation Program, under which the Port has purchased more than 1,360 homes, and the Neighborhood Reinforcement and Standard Insulation Programs to soundproof 10,000 additional homes (Port of Seattle 1991). Figure 3.2-1 shows the boundaries of the Noise Remedy Program areas, as well as the airport's annual average DNL (day-night average noise level) noise contours.

Many noise-sensitive receptors are located in the project area in the form of residences, apartment buildings, hospitals, libraries, parks, schools, retirement homes, and churches. Noise measurements were conducted at 38 representative receptor locations within the project area. Sensitive receptors evaluated in this FEIS were chosen based on accessibility and proximity to major projects, as well as their ability to represent overall conditions in the project area.

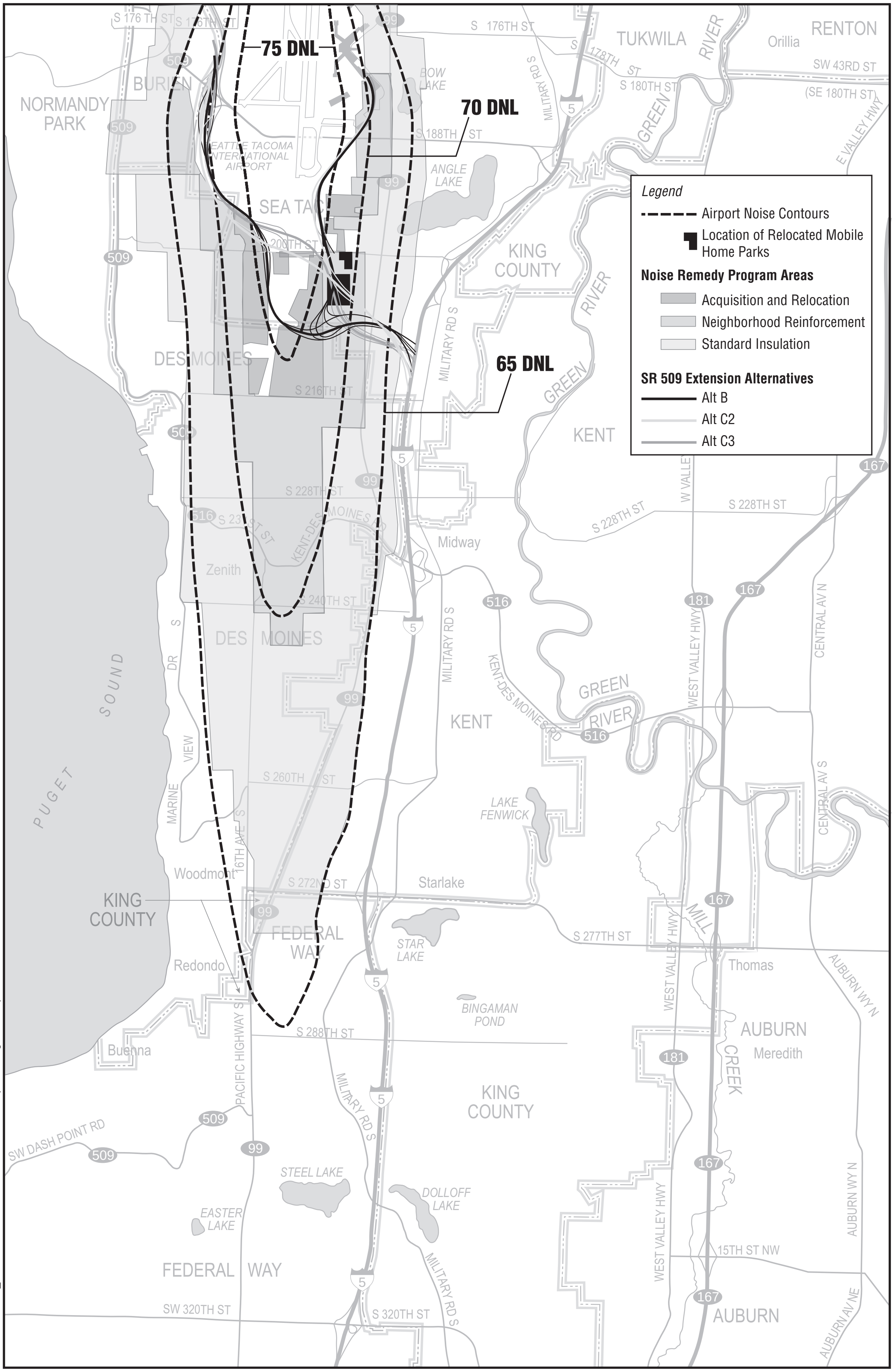
Existing Noise Levels

Ambient sound levels were measured to describe the existing noise environment and to identify major noise sources in the project area. Ambient sound levels were measured at 38 receptor locations in the project area; Figure 3.2-2 shows these locations.

Receptors were selected along the proposed project alignments at locations that would likely be impacted by traffic noise. Sound levels for the 30 receptors located along I-5 are presented in Table 3.2-3. Average noise levels (L_{eq}) at these receptors and at the receptors located during the HOV and truck climbing lane noise analyses were dominated by traffic and ranged from 54 to 78 dBA. Substantial noise sources other than traffic are also noted in Table 3.2-3. An additional eight measured receptors located in residential, commercial, industrial, and park areas near the proposed alignments for the build alternatives, where current traffic noise levels are minimal but the proposed project could create noise impacts (Table 3.2-3). In these areas, L_{eq} values ranged from 56 to 75 dBA. In most cases, the primary source of noise along the proposed alignments was aircraft operations.

The measured existing sound levels included all sounds that typically occur at each location. Noise measurements were taken only when unusual sounds did not occur; however, aircraft noise was included because it is common in the project area.

The dominant sources of noise in the project area are automobile and heavy truck traffic and aircraft overflights. Aircraft noise was dominant at receptors nearest the airport or directly in the flight path. Roadway noise was dominant at receptors located along I-5. Traffic speeds ranged from 30 to 55 mph.



141012.AB.J1.02_T082002007SEA / SR 509 PreFEIS / Chapter 3 / Fig 3.2-1 Airport Noise Contours / 1-2-03 / LW

0 1900 3800
Scale in Feet

North

FIGURE 3.2-1
Airport Noise Contours and Port of Seattle Noise Remedy Program Areas
SR 509: Corridor Completion/I-5/South Access Road Environmental Impact Statement

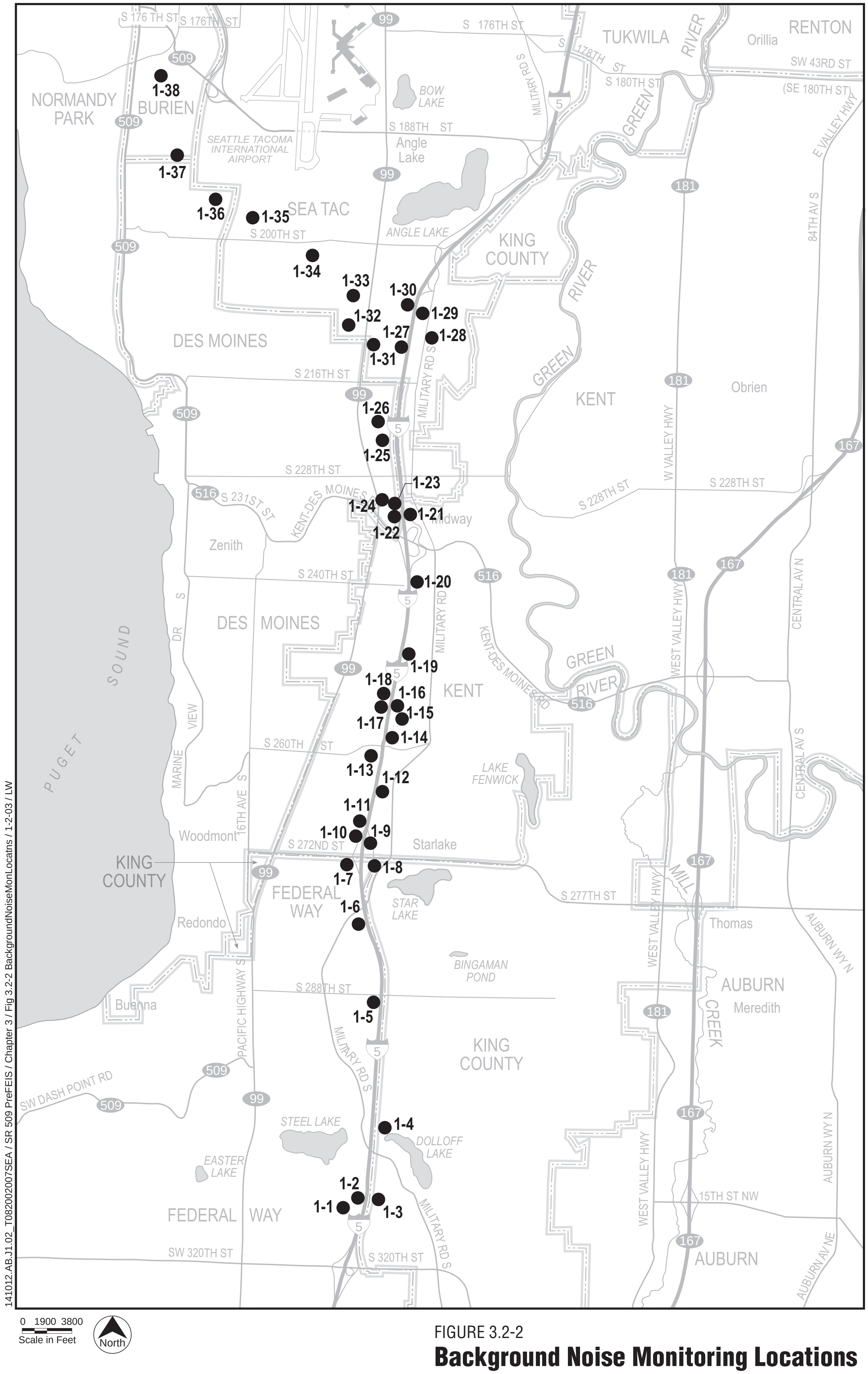


FIGURE 3.2-2

Background Noise Monitoring Locations

SR 509: Corridor Completion/I-5/South Access Road
Environmental Impact Statement

Table 3.2-3
Noise Measurement Receptor Locations

Receptor Number	Location	Distance to I-5 (feet)	Measured A-Weighted Noise Level (dBA) L_{eq}	Comments
1-1	Steel Lake Park	450	60	
1-2	Steel Lake Court Apartments, back parking lot facing Southbound I-5	125	75	Exceeds FHWA criterion
1-3	Corner of 32nd Ave/312th Street, facing Northbound I-5	525	63	
1-4	Corner of South 304th Street/31st Avenue South, facing Northbound I-5	75	72	Exceeds FHWA criterion
1-5	End of Sir Lancelot Court, facing Southbound I-5	115	78	Exceeds FHWA criterion
1-6	Residence at 28138 29th Avenue South	220	62	
1-7	Mark Twain Elementary	413	67	Aircraft noise; exceeds FHWA criterion
1-8	Church at South 272nd Street and Military Road	440	65	
1-9	Residence at 3004 South 271st Street	381	69	Some aircraft noise; exceeds FHWA criterion
1-10	Residence at 26810 28th Avenue South	135	68	Exceeds FHWA criterion
1-11	26818 28th Avenue South (backyard of residence facing Southbound I-5)	150	73	Exceeds FHWA criterion
1-12	Residence at 3024 South 256th Street	285	66	Approaches FHWA criterion
1-13	Royal Skies Apartments	289	66	Approaches FHWA criterion
1-14	Residence at 25625 32nd Place South	259	63	
1-15	Residence at 25410 33rd Place South	630	63	Mostly aircraft noise
1-16	Residence at 25217 32nd Place South	538	65	
1-17	Residence at 25344 31st Avenue South	171	64	
1-18	Residence at 25317 31st Avenue South	289	65	
1-19	Linda Heights Park, City of Kent	308	69	Exceeds FHWA criterion
	Linda Heights Park, western edge, 20 feet south of bird nesting area	270	71	Exceeds FHWA criterion
1-20	Residential area at South 35th Avenue and 240th Street South	220	69	Exceeds FHWA criterion
1-21	Church at 22809 Military Road	89	73	Exceeds FHWA criterion
1-22	Heritage Court Apartments	98	69	Some aircraft noise; exceeds FHWA criterion
1-23	Apartment Complex, 3028 in grass facing Southbound I-5	100	74	Exceeds FHWA criterion
1-24	Raintree Apartments	580	54	Exceeds FHWA criterion
1-25	Apartment Building at 3059 South 224th Street	98	74	Exceeds FHWA criterion
1-26	Midway Park at South 221st Street	600	59	

Table 3.2-3 Noise Measurement Receptor Locations				
Receptor Number	**Location**	**Distance to I-5 (feet)**	**Measured A-Weighted Noise Level (dBA)** L_{eq}	**Comments**
	Midway Park near entry to substation	350	70 71	Noise from I-5 and aircraft overflights Exceeds FHWA criterion
1-27	Residence at 21240 32nd Avenue South	116	65	Some aircraft noise
1-28	Residence at 21114 Military Road	620	64	Some aircraft noise
1-29	Residence at 3409 South 209th Street	190	69	Exceeds FHWA criterion
1-30	Sandpiper Apartments	160	61	
1-31	Residence at 21415 29th Avenue South	NA	68	Airplanes taking off; exceeds FHWA criterion
1-32	Residence at 20815 25th Avenue South	NA	75	Very loud airplane noise; exceeds FHWA criterion
1-33	Town and Country Villa Mobile Home Park	NA	69	Airplanes taking off; exceeds FHWA criterion
1-34	Des Moines Creek Park	NA	71 75	Airplanes taking off Exceeds FHWA criterion
1-35	Residence at 19509 13th Avenue South	NA	74	Airplanes taking off; exceeds FHWA criterion
1-36	Residence at 1045 South 194th Street	NA	63	Airplanes taking off
1-37	Residence at 860 South 192nd Street	NA	70	Airplanes taking off; exceeds FHWA criterion
1-38	Woodside School	NA	59	Some airplanes

NA = Not applicable; receptors are outside of the I-5 corridor.

Other sources of noise may include, but are not limited to, industrial and commercial activities, human voices in residences, children playing, and construction.

The highest traffic noise levels typically occurred during morning and evening rush hours. At the time of the Parry analysis in 1992, 28 receptors with sound levels at 60 to 76 dBA were identified. WSDOT estimated that nearly $3 million in noise barriers would have to be built to adequately mitigate the impacts associated with I-5 and the proposed HOV and truck climbing lane projects. Ten barrier systems were designed to supplement the two berms that were built in the 1980s to abate highway traffic noise for residents near the South 272nd Street interchange. Since then, 6 of the 10 recommended barriers have been constructed, reducing sound levels for adjacent residences by 7 to 10 dBA. The remaining four noise systems are awaiting construction funding.

Noise in Neighborhood Parks

Three parks could be adversely affected by increased noise levels due to the proposed project. These parks are Linda Heights Park, Midway Park, and Des Moines Creek Park. Background noise levels were measured at representative locations within the three parks (1-19, 1-26, and 1-34) near the proposed alternative alignments (Table 3.2-3).

Based on the results of these onsite noise level measurements and field observations, the following determinations were made:

- Traffic on I-5 is the dominant source of noise at Linda Heights Park. Existing average background noise levels near the west side of the park are in the 70 dBA range. Such levels are above the WSDOT/FHWA NAC.

- Existing noise exposure in Midway Park is dominated by noise from traffic on I-5. Current L_{eq} in the middle of the park are about 70 dBA. Such levels are above the WSDOT/FHWA NAC.

- At the Des Moines Creek Park, aircraft departures from Sea-Tac Airport are the main sources of environmental noise. Measured noise levels in the park average 71 to 75 dBA during periods when jet aircraft departures occur. In fact, based on the 1998 aircraft noise contours in the Sea-Tac Airport Part 150 Study Update (Port of Seattle 2000), aircraft noise exposure in Des Moines Creek Park is in the range of 70 dBA DNL.

3.2.3 Environmental Impacts

Noise from the proposed action would include short-term noise during road construction and long-term operational impacts from growth in traffic volumes and changes in traffic patterns on project area roadways. New construction and road sections that would be widened were analyzed for noise impacts. Noise modeling data for the projects, including the No Action Alternative, were used with aerial photographs to estimate the number of receptors that might be impacted in 2020 under each alternative.

Areas along the SR 509 freeway extension and north of SR 516 on both sides of I-5 contain residential parcels that could experience partial or full right-of-way acquisitions because of construction of the proposed project. If these parcels were to be acquired in total, the summary of noise impacts and proposed noise mitigation would be adjusted accordingly during the final design of the I-5 improvements.

Alternative A (No Action)

Under the No Action Alternative, traffic and noise levels would increase along the roadways because of development and transportation improvements in the project area that would increase traffic volumes. Under 2020 predicted traffic volumes, approximately 683 single-family residences would be within the 66 dBA contours (Table 3.2-4). Additionally, approximately 655 multifamily residential units, 1 school, 2 parks, 3 assisted care facilities, and 4 churches would experience similar effects, for a total of approximately 1,348 impacted receptors. When noise barriers planned by WSDOT are completed along I-5 as mitigation for previous projects, the number of impacted receptors will decrease. The number of receptors benefited by noise barriers will largely depend on the amount of right-of-way acquired for all the build alternatives.

The number of noise impacts under the No Action Alternative was determined by counting the number of sensitive receivers within a 66 dBA noise contour (developed using 2020 PM peak-hour traffic volumes) and assuming ideal noise propagation conditions. The same assumptions used to determine the existing impact contours were also used to determine impact contours under the No Action Alternative. Traffic volumes were taken from the results of the 2020 No Action Alternative travel demand traffic model provided by the TRANSPO Group. The number of impacts for the 2020 No Action Alternative was compared with the number of existing impacts, as well as the number of impacts in 2020 for the build alternatives.

Table 3.2-4 Estimated Number of Impacted Receptors by Alternative				
	2020 Alternative A (No Action)	2020 Alternative B	2020 Alternative C2 (Preferred)	2020 Alternative C3
Traffic Noise 66 dBA or Greater				
Single-family residential	683	1,638	1,744	1,636
Multifamily residential	655	806	819	979
Schools	1	3	3	3
Libraries	0	0	0	0
Hospitals and retirement homes	3	3	3	3
Parks	2	3	3	3
Churches	4	5	6	6
Total Receptors Impacted	**1,348**	**2,458**	**2,578**	**2,390**

Note: A receptor is any single-family residence, housing unit on a multifamily parcel, school, hospital, retirement home, park, or library. The number of individuals exposed at each receptor location was not determined. Mobile homes within the Sea-Tac Airport 70-DNL contour and properties acquired by the Sea-Tac Airport Noise Remedy Program are excluded from the counts.

Under the No Action Alternative, the noise levels in 2020 would increase at locations near I-5 and decrease at locations away from I-5. This is a direct result of the 33 percent forecasted increases in traffic volumes on I-5 and a decrease in background noise levels.

Impacts Common to All Build Alternatives

Projected traffic volumes on I-5 for each of the build alternatives are very similar, and would result in the same distances to the 66 dBA contours. Therefore, noise impacts in areas along I-5 would be common to all three build alternatives. The impacts summarized in Table 3.2-4 include all areas within the 66 dBA contour for the proposed I-5 improvements, which are common to all build alternatives.

Under all build alternatives, traffic noise exposure in Linda Heights Park and Midway Park would increase by only 1 dBA relative to the No Action Alternative. Nevertheless, future traffic noise levels within these two parks exceed the WSDOT/FHWA NAC for all of the build alternatives.

Alternative B

Under Alternative B, traffic noise levels would increase in parts of the project area because of development and transportation improvements. The number of impacts under Alternative B was determined by counting the number of existing sensitive receivers within a 66 dBA noise contour (developed using 2020 PM peak-hour traffic volumes) and assuming ideal noise propagation conditions. Of the three build alternatives, Alternative B would impact the fewest additional receptors. Most of the additional sensitive receptors impacted by traffic noise under Alternative B are multifamily units located near the proposed SR 509/I-5 interchange.

In 2020, approximately 1,638 single-family residences would be impacted by noise levels of 66 dBA or greater (Table 3.2-4). Additionally, approximately 806 multifamily residences, 3 schools, 3 assisted care facilities, 3 parks, and 5 churches would be impacted by traffic noise, for a total of approximately 2,458 impacted receptors. The widening of South 200th Street between SR 509 and the new South Access Road would not impact any additional receptors because this location is within the Sea-Tac Airport Noise Remedy Program acquisition area.

Noise levels would increase slightly over 1 dBA relative to the No Action Alternative for receptors located along I-5 south of SR 509. This is the result of a 33 percent increase in traffic south of SR 509. Noise-sensitive receptors along I-5 north of SR 509 would experience a slight noise level decrease (less than 1 dBA) relative to the No Action Alternative, resulting from an approximately 16 percent decrease in traffic volumes north of the SR 509 interchange proposed in Alternative B.

Alternative B would introduce traffic noise to some areas of Des Moines Creek Park. Current noise levels at this location (based on extrapolation of data from other nearby noise receptors) are roughly 5 dBA less than those experienced near the existing Des Moines Creek trailhead along South 200th Street (and the area that would be impacted by Alternatives C2 and C3). Background roadway traffic noise is virtually nonexistent. Without aircraft operations, daytime noise levels at this location are in the 45 to 50 dBA range. This location is approximately 3,000 feet farther south of the airport runways than the trailhead area. Aircraft are higher over this location and, thus, aircraft noise is slightly less (up to 2 dBA) than that experienced at the trailhead. Alternative B would introduce traffic noise into this relatively quieter area of the park.

Alternative C2 (Preferred)

Under Alternative C2, traffic and noise levels would increase in portions of the project area because of development and transportation improvements. The number of noise impacts under Alternative C2 was determined by counting the number of existing sensitive receivers within a 66 dBA noise contour (developed using 2020 PM peak-hour traffic volumes) and assuming ideal propagation conditions.

Using 2020 predicted traffic volumes, approximately 1,744 single-family residential parcels would be impacted by noise levels of 66 dBA and above (Table 3.2-4). Additionally, approximately 819 multifamily residential units, 3 schools, 3 hospitals/retirement homes, 3 parks, and 6 churches could experience similar effects, for a total of 2,578 impacted receptors. The widening of South 200th Street between SR 509 and the South Access Road would not impact any additional receptors because this location is within the Sea-Tac Airport Noise Remedy Program acquisition area.

Alternative C2 would introduce traffic noise to some areas of Des Moines Creek Park. Current noise levels in the vicinity of the area that would be affected are higher than elsewhere in the park. This is a result of being closer to the south end of the airport runways and the vehicular traffic along South 200th Street. Because of this current level of background aircraft and vehicular noise, project-related increases in hourly average noise levels are not predicted to be substantial. During periods when southerly airplane departures are in effect, there would be an increase of no more than approximately 1 dBA within the park immediately adjacent to SR 509. If peak-hour traffic coincided with times when aircraft would approach from the south, traffic noise levels could increase by up to 5 dBA in hourly average noise levels, which is considered insubstantial. It should be further noted that increased noise levels in this localized area would be diminished somewhat due to the height of the roadway structures.

Alternative C3

Outside of areas in the vicinity of I-5 and SR 99, Alternative C3 would have approximately the same level of traffic noise impacts on nearby noise-sensitive areas as Alternative C2. Using 2020 predicted traffic volumes, approximately 1,636 single-family residential parcels would be impacted by noise levels of 66 dBA and above (Table 3.2-4). Additionally, approximately 979 multifamily residential units, 3 schools, 3 hospitals/retirement homes, 3 parks, and 6 churches could experience similar effects, for a total of 2,390 impacted receptors.

The widening of South 200th Street between SR 509 and the South Access Road would not impact any additional receptors because this location is within the Sea-Tac Airport Noise Remedy Program acquisition and relocation area. The number of noise impacts under Alternative C3 was determined counting the number of existing sensitive receivers within a 66 dBA noise contour (developed using 2020 PM peak-hour traffic volumes) and assuming ideal propagation conditions.

Alternative C3 would introduce traffic noise to some areas of Des Moines Creek Park. Similar to Alternative C2, current noise levels in the areas that would be affected are higher than elsewhere in the park, the result of being close to the south end of the airport runways and the vehicular traffic along

South 200th Street. Because of this current level of background aircraft and vehicular noise, project-related increases in hourly average noise levels are not predicted to be substantial. During periods when southerly airplane departures are in effect, there would be an increase of no more than approximately 1 dBA within the park immediately adjacent to SR 509. If peak-hour traffic coincided with times when aircraft would approach from the south, traffic noise levels could increase by up to 5 dBA in hourly average noise levels, which is considered insubstantial. Additionally, increased noise levels in this localized area would be diminished somewhat due to the height of the proposed roadway structures.

3.2.4 Mitigation Measures

The following noise abatement measures are likely to be incorporated into the selected alternative (if the No Action Alternative is not selected). Because the build alternatives would be constructed on a new alignment, the level of currently available design detail is limited. Therefore, the mitigation measures identified have been based on two assumptions: (1) a reasonable barrier is one that is not longer than 100 feet per household benefited; and (2) all barriers are feasible. Both of these assumptions were applied equally to all build alternatives. It is WSDOT policy to make final decisions on the construction of noise barriers after final horizontal and vertical alignments are determined and a detailed engineering analysis of the feasibility and reasonableness of noise abatement can be made. Only barriers that meet WSDOT criteria as accepted by FHWA would be constructed.

A variety of mitigation methods can be applied to projects to reduce noise impacts. Noise impacts from long-term operation of highways after projects have been constructed can be reduced by acquiring land as buffer zones, realigning the roadway, and constructing noise barriers (such as earth berms). The following mitigation measures could be incorporated into the design and operation of the proposed project.

Barriers

Complete visual shielding of all traffic noise sources with tall barriers could reduce long-term noise levels by as much as 20 dBA, but such shielding would be difficult to achieve. Noise barriers generally reduce traffic noise levels by 7 to 10 dBA, depending on barrier height and the distance that the sensitive receptor is located from the barrier. The effectiveness of a barrier would be determined by its height and length and by the topography of the project site. To be effective, the barrier must block the "line-of-sight" between the highest point of a noise source, such as a truck exhaust stack, and a receiver located within an outdoor area of frequent human use. A barrier must be long enough to prevent sounds from passing around the ends of the barrier, have no openings such as driveway connections, and be dense enough so that a substantial amount of noise energy would not pass through it. Buildings that are not sensitive to noise could also be used as barriers. Barriers are less effective at reducing noise levels at locations that are farther from the noise source or are elevated above ground level, such as the second floor of a building. Roadway noise barriers would not decrease aircraft noise; therefore, they would provide little or no benefit in areas where ambient noise is dominated by aircraft.

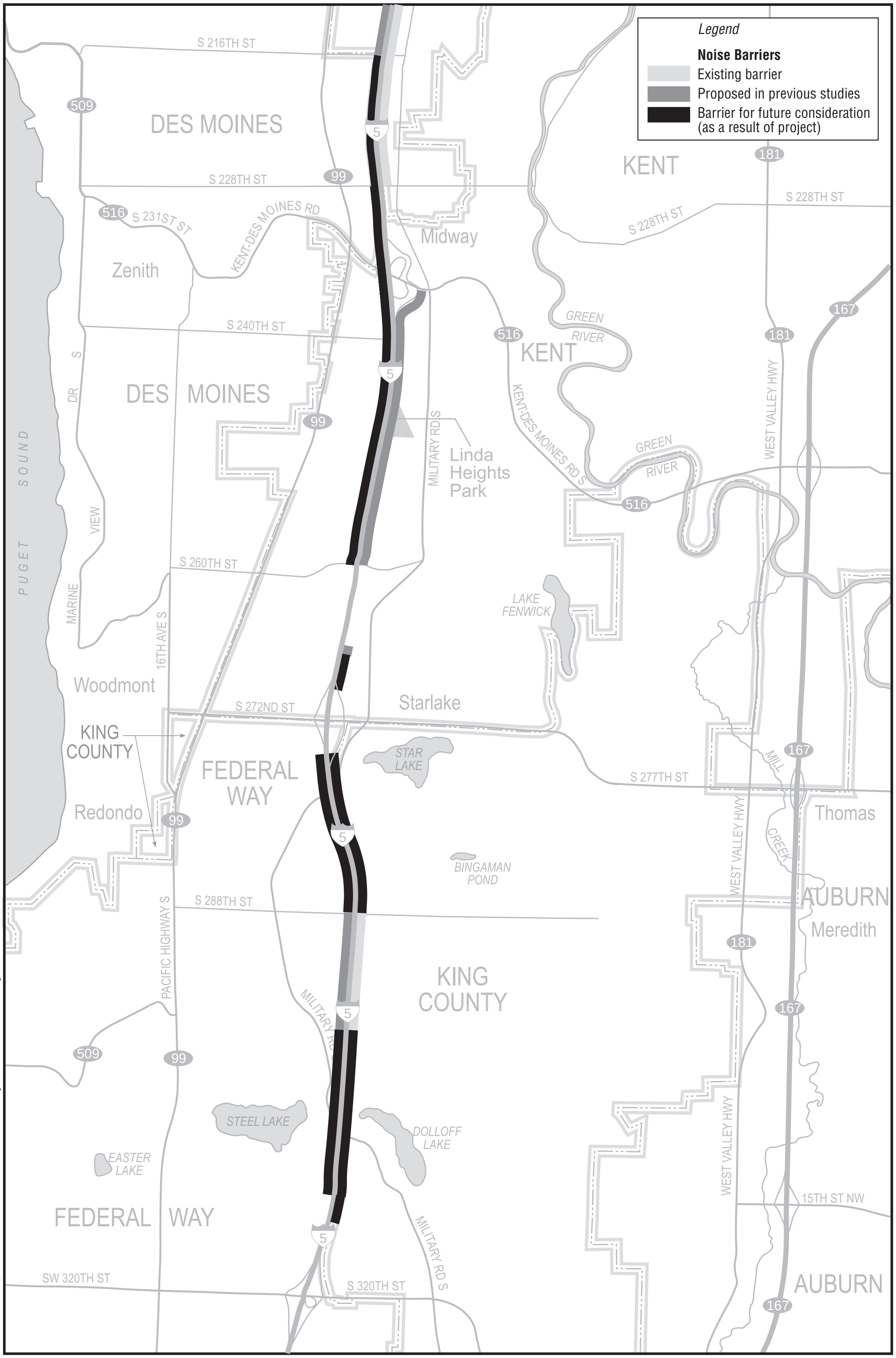
Under WSDOT policy D22-22, many factors are evaluated to determine whether barriers would be feasible and reasonable. The feasibility evaluation consists of engineering considerations, such as whether substantial noise reductions of 7 to 10 dBA can be achieved. The reasonableness evaluation considers factors such as the cost-effectiveness of the barriers and the concerns of the residents.

WSDOT is currently constructing or planning noise barriers along much of I-5 within the project area. Locations of noise barriers currently under construction or scheduled for construction along the east side of I-5 are shown on Figure 3.2-3. The locations include the area from roughly South 259th Lane to South 255th Street; South 252nd Street to South 248th Street; South 244th Street to South 241st Street; north of SR 516 to South 228th Street; South 221st Street to South 216th Street; and South 216th Street to South 211th Street. Additional locations that are planned but not yet finalized for construction are from South 211th Street to south of Military Road on the east side of I-5, and on the west side of I-5 from about South 211th Street to South 216th Street; South 216th Street to South 219th Street; and South 224th Street to SR 516.

Areas for barrier mitigation were considered for each of the build alternatives. Aerial photographs and field verification were used to determine appropriate areas for barrier evaluation based on residential land use. Final designs would not be available until noise barrier locations are identified during final design of the selected alternative; therefore, only general areas were determined where residents would likely be impacted by traffic noise and could possibly benefit from noise barriers. These areas are shown in Figures 3.2-4 through 3.2-6. Near Sea-Tac Airport, where aircraft noise dominates, noise barriers would not be effective at reducing noise levels; therefore, noise barriers may not be appropriate in some of the areas outlined in Figures 3.2-3 through 3.2-6. Exact length, height, and location of noise barriers would be determined during the design phase for the selected alternative as more information becomes available.

Potential Barriers Common to All Build Alternatives

Within the I-5 corridor between South 216th Street and South 310th Street, several areas within the 66-dBA contour could require mitigation. These mitigation areas along I-5 would be common to all build alternatives. Seven barrier locations were identified for future consideration (Figure 3.2-3):



141012.AB.J1.03_T12200200SSEA / SR 509 Final Notebook / Fig 3.2-3 Noise Barriers Along I-5 Corridor from RDEIS / 1-6-03 / LW

0 1900 3800
Scale in Feet

North

FIGURE 3.2-3
Potential and Constructed Noise Barrier Locations Along I-5 – All Alternatives

SR 509: Corridor Completion/I-5/South Access Road
Environmental Impact Statement

141012.AB.J1.03_T122002005SEA / SR 509 Final Notebook / Fig 3.2-4 PotentialNoiseBarrierLocations Alt B / 12-31-02 / LW

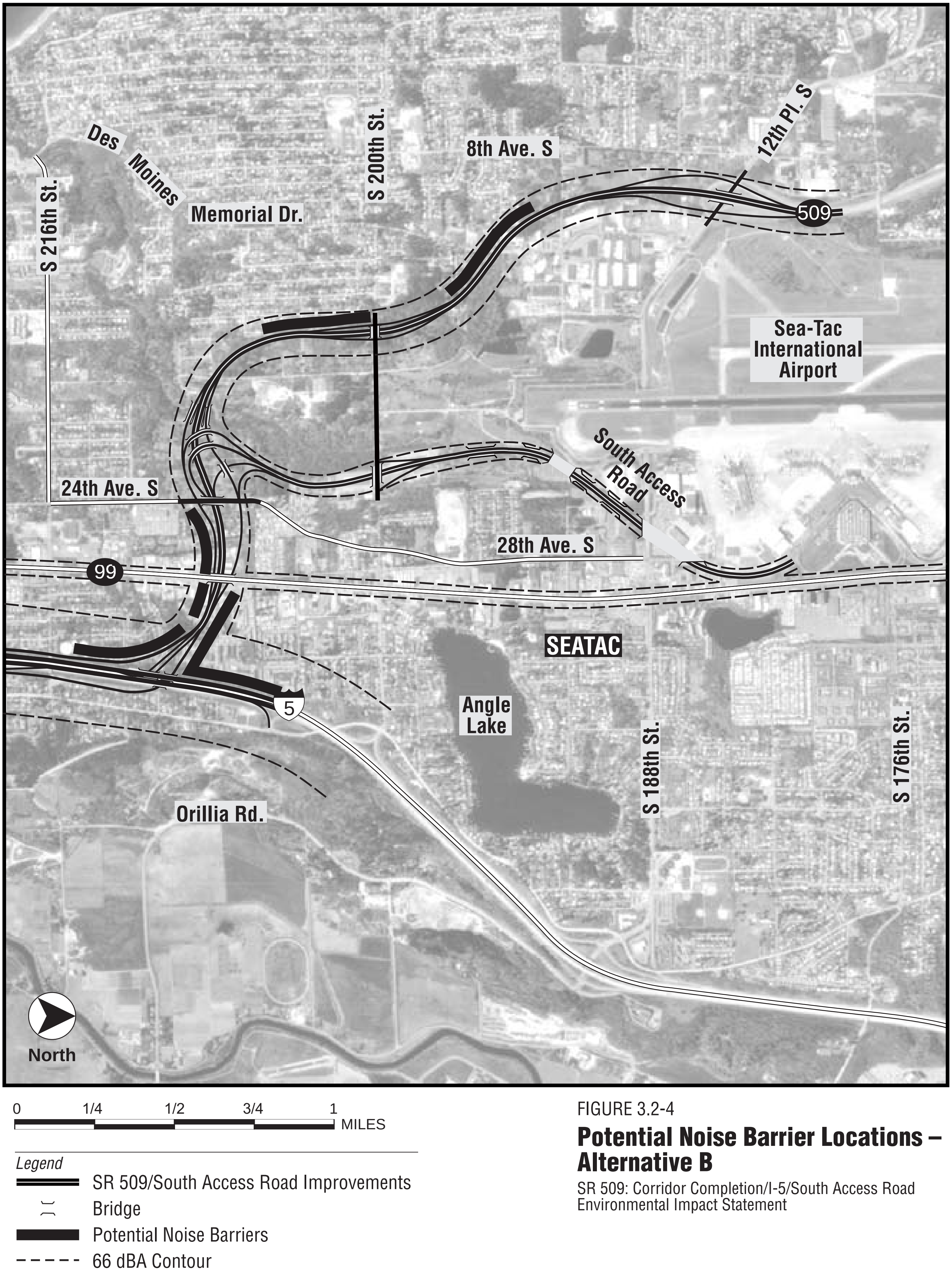


FIGURE 3.2-4

Potential Noise Barrier Locations – Alternative B

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141012.AB.J1.03_T122002005SEA / SR 509 Final Notebook / Fig 3.2-5 PotentialNoiseBarrierLoc Alt C2 Preferred / 1-9-03 / LW

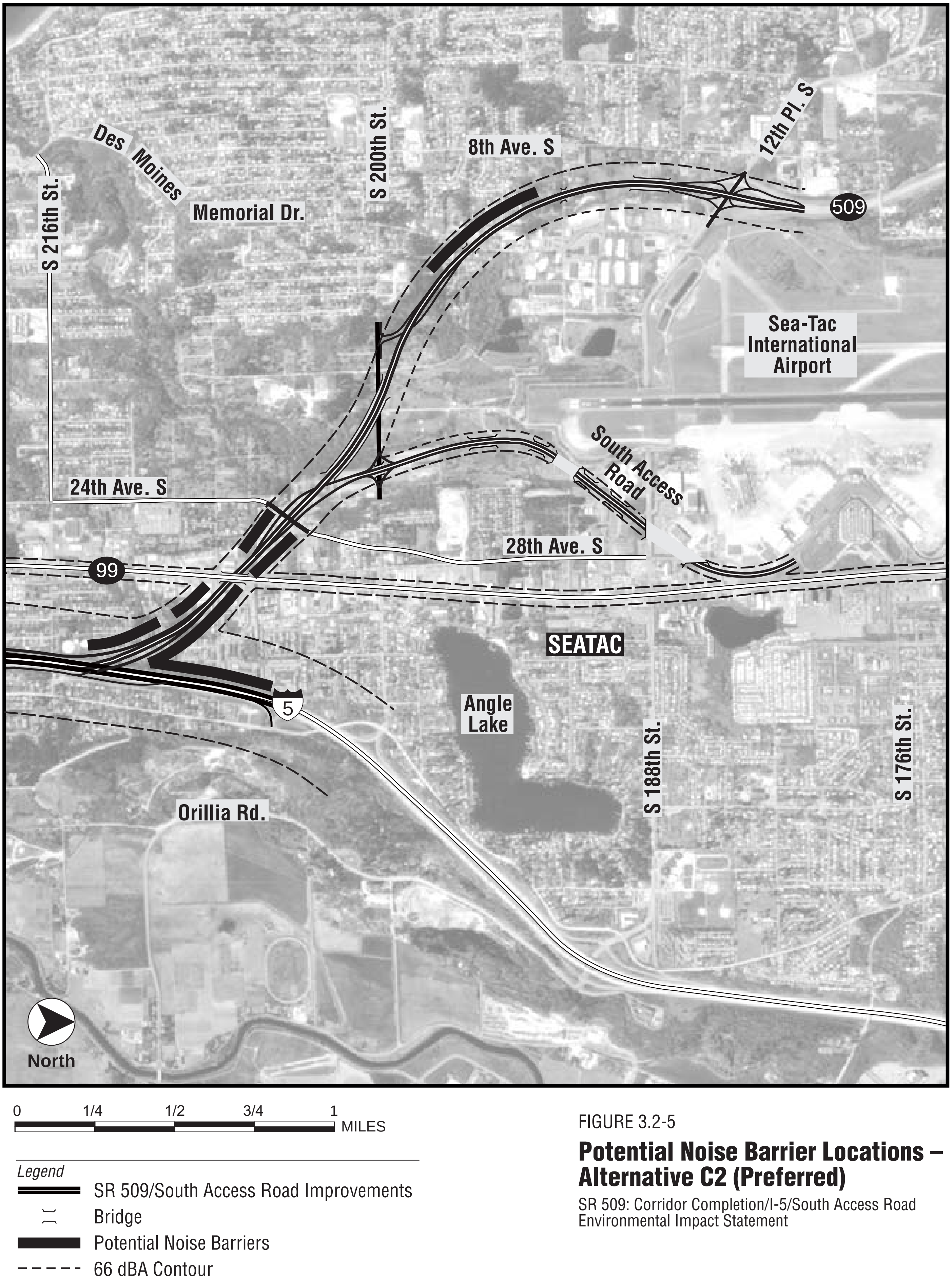

FIGURE 3.2-5

Potential Noise Barrier Locations – Alternative C2 (Preferred)

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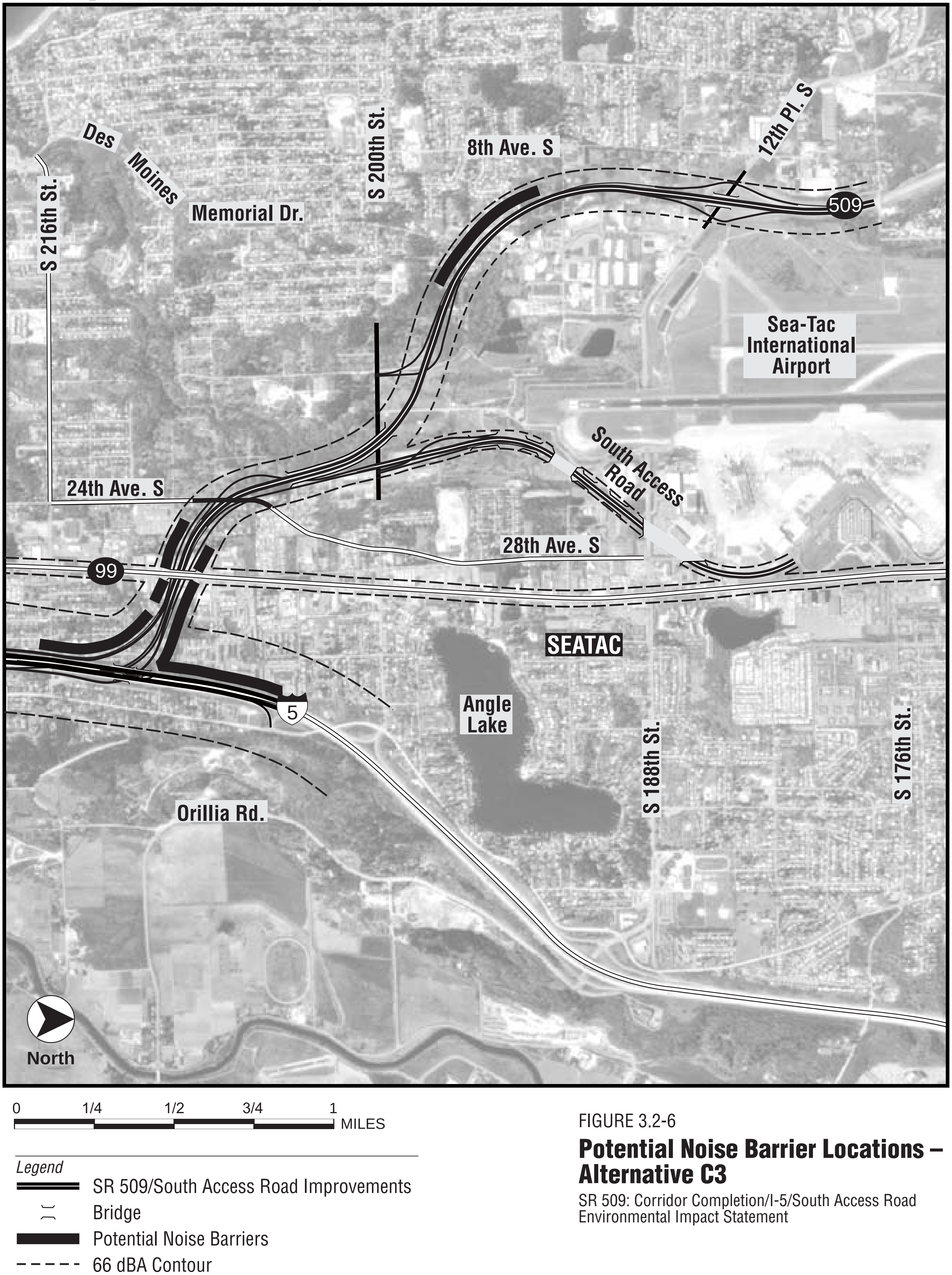

FIGURE 3.2-6

Potential Noise Barrier Locations – Alternative C3

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1. The residential area east of I-5 from South 310th Street to South 288th Street
2. The residential areas west of I-5 from South 310th Street to approximately 2,400 feet south of South 288th Street
3. The residential areas on both sides of I-5 from South 288th Street to South 272nd Street
4. The residential area on the east side of I-5 from South 272nd Street to South 268th Street
5. The residential area on the west side of I-5 from South 260th Street to South 228th Street
6. The residential area on the west side of I-5 from South 228th Street to South 216th Street

Alternative B

Seven additional potential barrier locations were identified (Figure 3.2-4):

1. Along the north side of SR 509 from I-5 to SR 99
2. Along the south side of SR 509 from I-5 to 32nd Lane South
3. Along the south side of SR 509 in the vicinity of 30th Avenue South
4. Along the south side of SR 509 from SR 99 to 24th Avenue South
5. Along the west side of SR 509 adjacent to 15th Avenue South from South 207th Street to South 200th Street
6. Along the west side of SR 509 from 196th Place to Des Moines Memorial Drive South
7. Along the west side of SR 509 from Des Moines Memorial Drive South to north of South 194th Street

Alternative C2 (Preferred)

Six additional potential barrier locations were identified (Figure 3.2-5):

1. Along the north side of SR 509 from I-5 to SR 99
2. Along the south side of SR 509 from I-5 to 32nd Lane South
3. Along the south side of SR 509 in the vicinity of 30th Avenue South to South 208th Street
4. Along the southwest side of SR 509 from SR 99 to 26th Avenue South
5. Along the northeast side of SR 509 from 27th Place South to a point south of 24th Avenue South

6. Along the west side of SR 509 from 13th Avenue South to Des Moines Memorial Drive South

Alternative C3

Six additional potential barrier locations were identified (Figure 3.2-6):

1. Along the north side of SR 509 from I-5 to SR 99
2. 0Along the south side of SR 509 from I-5 to 32nd Lane South
3. Along the south side of SR 509 in the vicinity of 30th Avenue South
4. Along the southwest side of SR 509 from SR 99 to 26th Avenue South
5. Along the east side of SR 509 beginning from South 208th Street northward
6. Along the west side of SR 509 from 15th Avenue South to Des Moines Memorial Drive South

Detailed Noise Barrier Evaluation

Since publication of the Revised DEIS, a detailed noise study was conducted to further evaluate the effectiveness of barriers as a noise abatement measure for the preferred alternative (Alternative C2), as required by FHWA. These barriers were further evaluated for feasibility and reasonableness in accordance with 23 CFR 772 and WSDOT Traffic Noise Analysis and Abatement Policies and Procedures. The preliminary results of the detailed analysis and recommended barrier locations are in Appendix I of this FEIS.

Other Possible Roadway Mitigation Measures

Noise impacts could also be reduced by land use controls throughout the project area. The Cities of Des Moines, Kent, Federal Way, and SeaTac and King County could implement land use plans and zoning that would restrict future land uses along SR 509 and I-5 to those compatible with roadway noise.

Public buildings could be insulated to reduce interior noise levels where it is determined that interior noise levels would approach or exceed FHWA's interior NAC of 52 dBA. Specific construction techniques could include acoustical doors and windows; insulation in walls, floors, and ceilings; and ventilation systems designed to preclude the need to open windows. Many of these activities have already been accomplished through the Sea-Tac Airport Noise Remedy Program for a number of public buildings and residences in the project area. Noise insulation would have no effect on exterior noise levels.

Retaining existing trees and vegetation and planting new vegetation along the selected alternative alignment would reduce noise annoyance psychologically by removing the noise source from view. To actually reduce noise levels, vegetation must completely block the line of sight between the observer and the source and be at least 15 feet tall. A dense line of trees with a depth of 100 feet would reduce noise by 5 dBA, in addition to the effect of distance (Barry and Reagan 1978).

3.2.5 Construction Activity Impacts and Mitigation

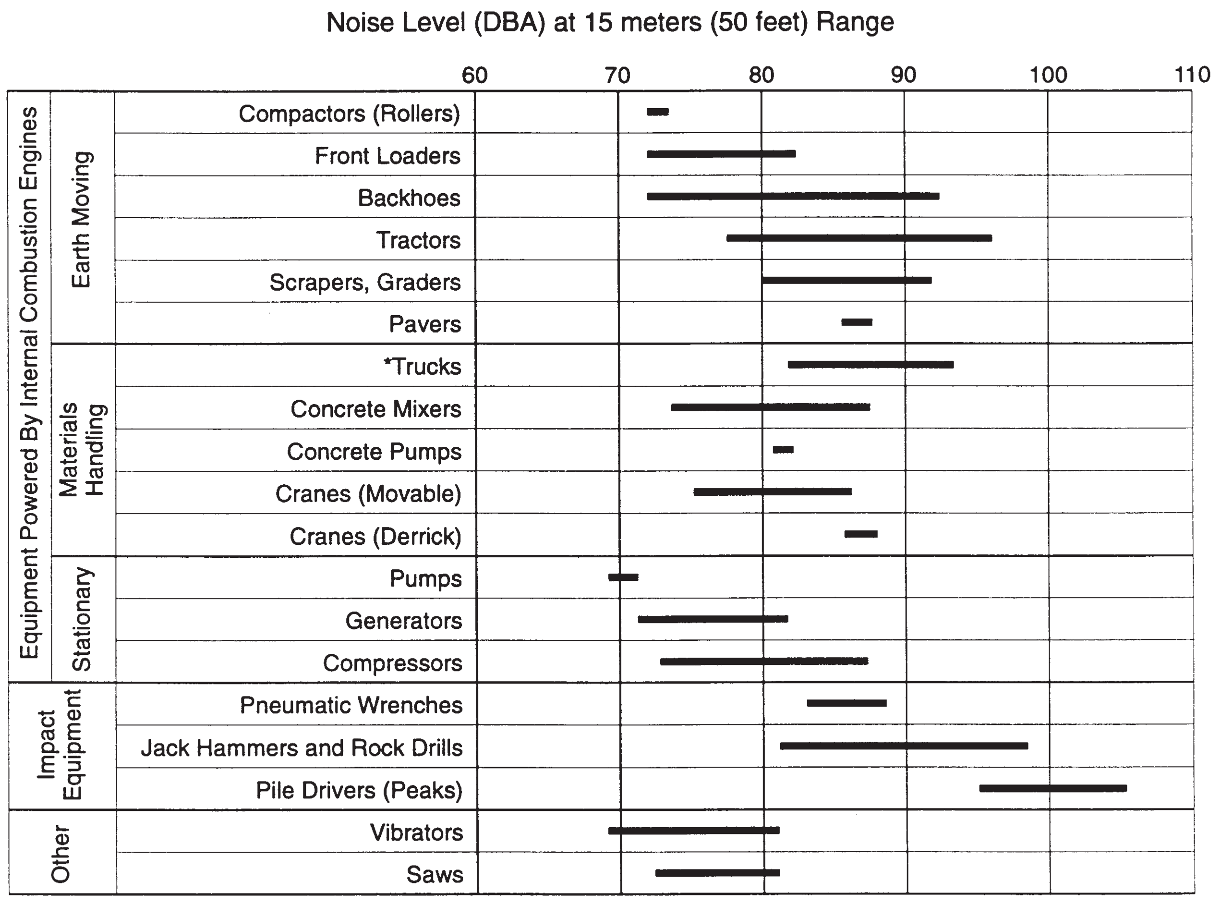
Construction Activity Impacts

Most typical highway construction activities would be common to all build alternatives. Roadways are usually constructed in several phases, each of which has its own mix of equipment and, consequently, its own noise characteristics. Roadway construction would involve clearing, cut-and-fill activities, pile driving, removing or reconditioning old roadways, bridge and wall construction, and paving.

The most prevalent noise source at construction sites is the internal combustion engine. Engine-powered equipment would include earth-moving equipment, vehicles, material-handling equipment, and stationary equipment. Mobile equipment operates in a cyclic fashion, while stationary equipment such as generators and compressors operates at fairly constant sound levels. Because trucks would be present during most phases of construction and would not be confined to the construction site, noise from trucks could affect more receptors. Other noise sources would include impact equipment and tools such as jackhammers. Impact tools could be pneumatically powered, hydraulic, or electric.

Construction noise would be short term in nature and limited to the length of the construction period. Construction noise effects would be temporary, intermittent, and depend on the type, amount, and location of construction activities. The construction methods used would determine the maximum noise levels of the construction equipment. The amount of construction activity would determine how often construction noise would occur throughout the day. The location of construction equipment relative to adjacent properties would determine any effects of distance in reducing construction noise levels.

Maximum noise levels of construction equipment under any of the build alternatives would be similar to the typical maximum construction equipment noise levels presented in Figure 3.2-7 at 50 feet from the equipment. Maximum noise levels from construction equipment would range from 69 to



* Current measurements indicate truck noise level of 78-90

NOTE: Based on limited available data samples.

SOURCE: U.S. Environmental Protection Agency,
"Noise from Construction Equipment and Operations, Building
Equipment, and Home Appliances," NTID 300.1, December 31 1971.
Revised WSDOT District 1, February, 1991.

FIGURE 3.2-7

Construction Equipment Noise Ranges

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106 dBA at 50 feet. Construction noise at residences farther away would experience a decrease at a rate of 6 dBA per doubling of distance from the source. Extrapolating from Figure 3.2-7, maximum noise levels at 200 feet would range from 57 to 94 dBA. The number of occurrences of the L_{max} would increase during construction, particularly during pile-driving activities. Because various equipment would be turned off, idling, or operating at full power at any time, average L_{eq} noise levels during the day would be less than the maximum noise levels presented in Figure 3.2-7.

Alternative A (No Action)

There would be no construction noise impacts under the No Action Alternative.

Alternative B

Alternative B, including the South Access Road, would require the construction of 3.8 miles of new roadway. This would only be slightly more new construction than under Alternatives C2 or C3; therefore, only slightly more area would be affected by construction noise.

Alternative C2 (Preferred)

Alternative C2, including the South Access Road, would require the construction of 3.2 miles of new roadway. The number of receivers affected by construction noise would likely be lowest under this alternative.

Alternative C3

Alternative C3, including the South Access Road, would require the construction of 3.5 miles of new roadway. Alternative C3 would potentially expose a lower number of receivers to construction noise than Alternative B.

Mitigation Measures

Contractors are required to comply with all state and local regulations governing equipment source levels and noise resulting from the construction site activities during the life of the improvement. However, daytime construction activities are generally exempt from these limits. Construction noise can annoy people living and working in the area. Some simple and inexpensive techniques would be used to minimize the negative effects:

- Stationary noise sources would be placed as far from sensitive receivers as possible. Portable noise barriers, vehicles, and equipment or natural terrain features can be used between the noise source and sensitive receivers to provide shielding.

- Idling equipment would be turned off. Equipment operators would drive forward instead of backward whenever possible, lift instead of drag materials, and avoid scraping or banging activities to do work that can be accomplished by quieter hand methods.

- Work that does not need to be done at night would be confined to daytime hours. When work must be done at night, the contractor would complete the noisiest work as early as possible following ordinances of local jurisdictions.

- Construction noise can be further reduced through the use of properly sized and maintained mufflers, engine intake silencers, ambient sensitive backup alarms, engine enclosures, noise blankets, and rubber linings.

SEA/3-2 noise.doc